



National Aeronautics
and Space Administration

May 26, 1997
NRA 97-OSS-09

RESEARCH ANNOUNCEMENT

ROSSI X-RAY TIMING EXPLORER (RXTE) GUEST OBSERVER PROGRAM CYCLE 3

Proposals Due:

September 5, 1997

OMB Approval No. 2700-0087

ROSSI X-RAY TIMING EXPLORER
GUEST OBSERVER PROGRAM

Cycle 3

NASA Research Announcement
Soliciting Proposals for Basic Research

NRA 97-OSS-09

Release Date: May 26, 1997
Proposal Due Date: September 5, 1997

Office of Space Science
National Aeronautics and Space Administration
Washington, DC 20546-0001

ROSSI X-RAY TIMING EXPLORER GUEST OBSERVER PROGRAM

Cycle 3

This NASA Research Announcement (NRA) solicits basic research proposals for participation in the National Aeronautics and Space Administration (NASA) program for the conduct of space science observations and subsequent analysis of the resultant scientific data from the Rossi X-ray Timing Explorer (RXTE). The primary goal of the RXTE mission is to investigate the nature and physics of compact astrophysical objects as revealed through temporal variations in their high energy emission on time scales from microseconds to years.

This NRA is the third announcement for the RXTE Guest Observer Program and solicits proposals for Cycle 3 of the mission, which will begin on January 1, 1998, and last approximately one year. All of the observing time is available to Guest Observers during this phase.

Participation is open to all categories of organizations, both domestic and foreign, including educational institutions, NASA Centers, profit and not-for-profit organizations, and other Government agencies. Proposals may be submitted at any time during the period ending September 5, 1997. Proposals received after that date will be held for the next review cycle. Letters of Intent to Propose are not required. Proposals will be evaluated by a scientific peer-review panel with a goal of announcing the selections in December 1997. A detailed schedule specifying proposal deadlines and important mission milestones is provided in Appendix C to this NRA.

Proposers whose investigations are selected will have proprietary use of their data for 12 months after receipt of the data, after which time the data will be made available to other interested investigators through a public data archive.

Funds for awards under this NRA are expected to be available subject to the annual NASA budget cycle. The Government's obligation to make awards is contingent upon the availability of appropriated funds from which payment for award purposes can be made and the receipt of proposals which the Government determines are acceptable for award under this NRA. It is expected that, with few exceptions, investigations selected for award under this NRA will be funded through the use of grants.

The proposal review will be conducted in two stages. During the first stage, the scientific and technical merits of the proposed investigation will be reviewed, as well as consideration of the appropriateness of using RXTE to achieve the scientific objectives. The review panel will provide NASA with a prioritized list of proposals to be awarded observing time. In the second stage of the selection process, investigators whose proposals have been recommended for

continued consideration will be asked to submit a proposed budget to support their investigation. A subset of the original review panel may be convened approximately 30 days after the initial review to evaluate the proposed budgets and to provide NASA with recommendations for final selection and award of observing time.

The total amount of funding available for the support of Guest Observers for the present observing opportunity is anticipated to be approximately \$1 million. The total amount awarded is contingent on the availability of appropriated funds from which payment for award purposes can be made and the receipt of proposals which are acceptable for award under this NRA. It is anticipated that approximately 100 investigations will be recommended for selection.

Further details relevant to the RXTE Guest Observer Program are included in the Appendices that are listed on page 5 and described below. This NRA and its Appendices may be downloaded directly via the World Wide Web, and the Appendices and pertinent reference documents are available via anonymous file transfer protocol (ftp), at the addresses given below. The RXTE Technical Description presents a detailed description of the mission and gives information on using RXTE as an astrophysical observatory. The RXTE Technical description, which was Appendix F of the RXTE Guest Observer Program Cycle 1 NRA, is also available via ftp. Individuals not having access to the Internet may request paper copies of this Announcement and reference documents at the addresses given below. Requests for copies should be made at the earliest opportunity to ensure receipt early in the proposal preparation period.

Appendix A gives an overview of the mission and describes the observing opportunity. Appendix B gives the general instructions for responding to NASA Research Announcements. Appendix C, which supersedes and augments Appendix B, provides additional, mission-specific information on proposal submission and subsequent evaluation, selection, and implementation. The information in Appendix C applies to this NRA only. Appendix D contains the forms and instructions needed to prepare proposals in response to this NRA.

IDENTIFIER:	NRA 97-OSS-09
PROPOSAL DUE DATE:	September 5, 1997
NUMBER REQUIRED:	20 hard copies, including signed original Electronic submission of proposal forms also required
SELECTING OFFICIAL:	Director Research Program Management Division Office of Space Science

SUBMIT PROPOSALS TO: RXTE Guest Observer Facility
Ref: NRA-97-OSS-09
Code 660.2
Building 2, Room W20C
Goddard Space Flight Center
National Aeronautics and Space Administration
Greenbelt, MD 20771-0001
USA

OBTAIN ADDITIONAL PROGRAMMATIC INFORMATION FROM: Dr. Paul Hertz
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DIRECT TECHNICAL QUESTIONS TO: Dr. Alan Smale
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Code 660.2
Goddard Space Flight Center
National Aeronautics and Space Administration
Greenbelt, MD 20771-0001
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TEL: 301-286-7063, FAX: 301-286-1682
E-mail: xtehelp@athena.gsfc.nasa.gov

REQUEST PRINTED APPENDICES AND TECHNICAL DESCRIPTION FROM: RXTE Guest Observer Facility
Code 660.2
Goddard Space Flight Center
National Aeronautics and Space Administration
Greenbelt, MD 20771-0001
USA
TEL: 301-286-7063, FAX: 301-286-1682
E-mail: xtehelp@athena.gsfc.nasa.gov

RETRIEVE APPENDICES ELECTRONICALLY FROM:
World Wide Web: <<http://www.hq.nasa.gov/office/oss/>>, Research Opportunities
or <http://heasarc.gsfc.nasa.gov/docs/xte/xte_1st.html>, Proposals
Anonymous ftp: <legacy.gsfc.nasa.gov> in directory </xte/nra>

NASA appreciates your interest and cooperation in participating in the Rossi X-ray Timing Explorer Guest Observer Program.

Alan N. Bunner
Science Program Director
Structure and Evolution of the Universe
Office of Space Science

Appendices:

- A: RXTE Guest Observer Program Mission Description
- B: Instructions for Responding to NASA Research Announcements for Solicited Basic Research Proposals
- C: Additional Information Regarding Proposal Submission, Evaluation, Selection, and Implementation
- D: Filling out RXTE Proposal Forms

RXTE Guest Observer Program Mission Description

A.1 Mission Overview

The Rossi X-ray Timing Explorer (RXTE) satellite was launched on a Delta II rocket on December 30, 1995. The scientific instruments have been developed by science and engineering teams at the NASA Goddard Space Flight Center (GSFC), the University of California at San Diego (UCSD), and the Massachusetts Institute of Technology (MIT). The project is managed by GSFC and is sponsored by the National Aeronautics and Space Administration Office of Space Science (OSS). The observing time on RXTE is available to the international user community through peer-reviewed proposals.

The primary purpose of RXTE is to study the structure and dynamics of compact X-ray sources, including accreting neutron stars, white dwarfs, and black holes in our galaxy and compact, massive objects thought to be present in the nuclei of active galaxies. This is accomplished through observations of temporal and broad-band spectral phenomena. A wide variety of physical processes are involved. RXTE targets are often characterized by substantial X-ray emission in the 2-250 keV energy range and vary in X-ray intensity on a wide range of time scales. RXTE is designed to study the intensity variations of these objects over times as short as microseconds and as long as years. The scientific objectives of successful RXTE investigations will address questions concerning the fundamental physics and astrophysics of such systems, including:

- characteristics of dense matter;
- behavior of plasma in high magnetic fields;
- identification of stellar black holes;
- interaction of binary stars through mass exchange and radiation;
- General Relativity tests;
- the nature of quasi-periodic oscillators;
- the evolution and fate of compact X-ray sources; and
- the nature of the central engine of active galactic nuclei.

To achieve these goals, RXTE's science payload allows the determination of properties of compact objects (masses, moments of inertia, magnetic fields), properties of the system dynamics (accretion onto different types of compact objects), and properties of the emission regions. In addition, RXTE can respond quickly (within 7-24 hours, depending upon the type of trigger) to X-ray transients and other unpredictable time-critical events. RXTE can also address objectives concerning several classes of noncompact objects, including active stars, clusters of galaxies, and diffuse emission regions.

A.2 Science Payload

RXTE carries three scientific instruments: (i) the Proportional Counter Array (PCA), (ii) the High-Energy X-ray Timing Experiment (HEXTE), and (iii) the All-Sky Monitor (ASM). The PCA and HEXTE are co-aligned; the ASM scans the sky over several hours. The data from the

PCA and the ASM are fed into the Experiment Data System (EDS) for preliminary data

processing, whereas HEXTE has its own dedicated processing electronics. The primary mode for utilizing RXTE for the conduct of scientific investigations is through requests for observing time using the PCA and HEXTE instruments. Due to its nature, observing time on the ASM cannot be proposed for.

The PCA is a mechanically-collimated array of five xenon (Xe) proportional counters with a total effective area of $\sim 7000 \text{ cm}^2$. The counters are sensitive to X-rays in the 2-60 keV band. The collimators restrict the detector's field-of-view to ~ 1 degree. Two gas volumes are present in the PCA; the main volume contains Xe with a small quantity of methane at a pressure of 1.1 atm. A front layer of propane is used to screen out unwanted electron-induced events. The propane layer has a low absorbing efficiency for photons with energies above ~ 3 keV. Each of the five detectors carries a ^{241}Am source that provides calibration lines. The output of the PCA is routed through the EDS for analysis before transmission to the ground station.

The EDS has 8 Event Analyzers (EA's) which process the detected events according to selectable programs. Six EA's are dedicated to handling the PCA data while the other two EA's are dedicated to the ASM. Two of the EA's dedicated to the PCA generate data in Standard Modes for the RXTE archive. One EA builds energy histograms in 16-sec intervals as a standard product. A second EA builds a time series with 0.125 sec bins for each of the PCA layers as a standard product. The configurations of the remaining 4 EA's can be selected by the user, with parameters of temporal and spectral resolution appropriate to the constraints imposed by the telemetry rates. The PCA data contains information needed to estimate the background during an observation from a model based upon observations of off-target fields.

HEXTE is sensitive to photons in the 15 to 250 keV range. NaI(Tl) and CsI(Na) scintillation crystals, in the phoswich configuration, optically coupled to photomultiplier tubes, comprise the HEXTE detectors. The thickness of the NaI crystals was chosen to give high efficiency for stopping hard X-rays while still maintaining a low intrinsic background. The field-of-view is mechanically collimated to be $\sim 1^\circ$. HEXTE contains two clusters of 4 detectors with a total collecting area of 1600 cm^2 . The clusters are co-aligned with the PCA in their rest position; they will usually be commanded to rock $\pm 1.5^\circ$ or $\pm 3^\circ$ to provide data for background subtraction by sampling the on-source and the off-source (i.e., background) fluxes. An individual ^{241}Am source is present above each detector for continuous automatic gain control and in-orbit calibration. HEXTE has its own data system that processes the data prior to inserting it into the telemetry stream.

The ASM consists of three scanning shadow cameras (SSC's) on a rotating assembly. Each SSC is a one-dimensional position-sensitive proportional counter with a coded mask over a collimator with a $6^\circ \times 90^\circ$ field-of-view. The angular resolution in the 6° direction is $10'$. Two SSC's view the sky perpendicular to the ASM rotation axis; the third SSC views the direction parallel to the rotation axis. The two perpendicular SSC's are canted by 24° with respect to each other. The ASM gives an error box of $\sim 0.2^\circ$ by $\sim 1^\circ$ for weak sources and $\sim 3'$ by $\sim 15'$ for strong sources. About 70% of the sky is covered during the course of an orbit. The remainder of the sky can be covered within a day by spacecraft maneuvers. The SSC detectors are proportional counters with Xe-CO₂ at 1.2 atm, sensitive in the 2-10 keV band.

Updates on the current status of the RXTE science payload can be found on the RXTE Guest Observer Facility homepage, at http://heasarc.gsfc.nasa.gov/docs/xte/xte_1st.html.

A.3 Operation

RXTE was launched into a low-earth orbit on a Delta II launch vehicle on December 30, 1995. The orbit is circular with an altitude of 580 km, an inclination of 23 degrees, and an orbital period of 96 minutes. The baseline mission lifetime is 2 years with an expected orbital lifetime of 10 years.

Communications with the spacecraft occur through the Tracking and Data Relay Satellite System (TDRSS). RXTE has a low-gain antenna system for emergency operations and a high-gain antenna system for normal operations. Multiple access (MA) and single access (SA) TDRSS command and telemetry links are supported. An approximately 10-minute command period is scheduled each orbit. The data used in monitoring observations and in determining the presence of targets of opportunity (TOO) are delivered each orbit through a TDRSS contact to the ground via the MA link. Telemetry comes to GSFC via the White Sands Ground Terminal (WSGT). The telemetry stream goes to the Mission Operations Center, to the Data Capture Facility, and to the Science Operations Center (SOC). The SOC is responsible for generating the science timeline which incorporates user-imposed constraints as well as the instrument- or satellite-imposed constraints. Also, in cases where it will enhance the scientific return from an investigation, real-time monitoring of the progress of an observation is possible at the SOC.

A.4 Proposal Policy Summary

After the 30-day In Orbit Check-out (IOC) phase, observing time on RXTE was opened to observations selected from competitive proposals submitted during the Cycle 1 NRA. The current Cycle 3 NRA covers observations for the twelve months beginning approximately January 1, 1998. Note that 100% of the observing time is available to the scientific community; i.e., there is no guaranteed time for the instrument teams. Investigations to be carried out with RXTE are selected by a competitive peer review process directed by the cognizant discipline scientist in the Office of Space Science, NASA Headquarters. The selecting official is the Director, Research Program Management Division, Office of Space Science. Prospective investigators may propose for observing time using either or both the PCA and HEXTE instruments. Both instruments will view the target field and obtain data with independent telemetry allocations; the use of one instrument does not preclude use of the other to view the same source. For operations purposes, information is required about the expected count rate and telemetry rate of both instruments. Successful proposers will receive the data from both instruments. It is anticipated that programs involving a range of observing times will be recommended for implementation (see C.3.1.2).

Results of the routine quick-look and more comprehensive analyses of the ASM data are determined by the RXTE ASM team and placed in a public archive as soon as possible after the data are obtained. All ASM data is nonproprietary. Proposals for specific configurations or observing sequences using the ASM will not be accepted. Proposals to support analysis of ASM data are not permitted under this NRA; financial support for ASM data analysis should instead be submitted to the Astrophysics Data Program (ADP). The NRA calling for proposals to the ADP is expected to be released in late 1997.

For more details about the science payload and operations plan, please see Appendix C and the RXTE Technical Description (available from the RXTE Guest Observer Facility).

A.5 The RXTE Science Operations Center

The RXTE Science Operations Center (SOC) consists of two entities: the Science Operations Facility (SOF), responsible for the planning and conduct of RXTE observations, and the Guest Observer Facility (GOF), which supports the proposal process and post-observation data analysis. All raw telemetry, containing both instrument and spacecraft data, are sent to the SOC, which is located at the NASA Goddard Space Flight Center in Greenbelt, Maryland. After the data are converted to FITS format, the RXTE Science Data Center distributes the data on tape to the Principal Investigator of each specific observation. The GOF supports observers with their analysis of these data. The GOF is part of the Office of Guest Investigator Programs at the Laboratory for High Energy Astrophysics, NASA Goddard Space Flight Center. The GOF provides technical information, if needed, for the preparation of proposals, validates and distributes calibration data, provides some data analysis software, provides expert help and documentation, and assists in the creation of the RXTE archive.

**INSTRUCTIONS FOR RESPONDING TO
NASA RESEARCH ANNOUNCEMENTS****Part 1852.235-72**

NASA Federal Acquisition Regulations (FAR) Supplement (NFS)
Version 89.90, Effective March 11, 1997.

Accessible at URL

<<http://www.hq.nasa.gov/office/procurement/regs/nfstoc.htm>>,
open Part 1852.228 to 1852.241 from menu.

(JANUARY 1997)

A. General.

(1) Proposals received in response to a NASA Research Announcement (NRA) will be used only for evaluation purposes. NASA does not allow a proposal, the contents of which are not available without restriction from another source, or any unique ideas submitted in response to an NRA to be used as the basis of a solicitation or in negotiation with other organizations, nor is a preaward synopsis published for individual proposals.

(2) A solicited proposal that results in a NASA award becomes part of the record of that transaction and may be available to the public on specific request; however, information or material that NASA and the awardee mutually agree to be of a privileged nature will be held in confidence to the extent permitted by law, including the Freedom of Information Act.

(3) NRA's contain programmatic information and certain requirements which apply only to proposals prepared in response to that particular announcement. These instructions contain the general proposal preparation information which applies to responses to all NRA's.

(4) A contract, grant, cooperative agreement, or other agreement may be used to accomplish an effort funded in response to an NRA. NASA will determine the appropriate instrument. Contracts resulting from NRA's are subject to the Federal Acquisition Regulation (FAR) and the NASA FAR Supplement (NFS). Any resultant grants or cooperative agreements will be awarded and administered in accordance with the NASA Grant and Cooperative Agreement Handbook (NPG 5800.1).

(5) NASA does not have mandatory forms or formats for responses to NRA's; however, it is requested that proposals conform to the guidelines in these instructions. NASA may accept proposals without discussion; hence, proposals should initially be as complete as possible and be submitted on the proposers' most favorable terms.

(6) To be considered for award, a submission must, at a minimum, present a specific project within the areas delineated by the NRA; contain sufficient technical and cost information to

permit a meaningful evaluation; be signed by an official authorized to legally bind the submitting organization; not merely offer to perform standard services or to just provide computer facilities or services; and not significantly duplicate a more specific current or pending NASA solicitation.

B. NRA-Specific Items. Several proposal submission items appear in the NRA itself: the unique NRA identifier, when to submit proposals, where to send proposals, number of copies required, and sources for more information. Items included in these instructions may be supplemented by the NRA.

C. Proposal Content. The following information is needed to permit consideration in an objective manner. NRA's will generally specify topics for which additional information or greater detail is desirable. Each proposal copy shall contain all submitted material, including a copy of the transmittal letter if it contains substantive information.

(1) *Transmittal Letter or Prefatory Material*.

- (i) The legal name and address of the organization and specific division or campus identification, if part of a larger organization;
- (ii) A brief, scientifically valid project title intelligible to a scientifically literate reader and suitable for use in the public press;
- (iii) Type of organization: e.g., profit, nonprofit, educational, small business, minority, women-owned, etc.;
- (iv) Name and telephone number of the principal investigator and business personnel who may be contacted during evaluation or negotiation;
- (v) Identification of other organizations that are currently evaluating a proposal for the same efforts;
- (vi) Identification of the NRA, by number and title, to which the proposal is responding;
- (vii) Dollar amount requested, desired starting date, and duration of project;
- (viii) Date of submission; and
- (ix) Signature of a responsible official or authorized representative of the organization, or any other person authorized to legally bind the organization(unless the signature appears on the proposal itself).

(2) *Restriction on Use and Disclosure of Proposal Information*. Information contained in proposals is used for evaluation purposes only. Offerors or quoters should, in order to maximize protection of trade secrets or other information that is confidential or privileged, place the following Notice on the title page of the proposal and specify the information subject to the notice by inserting an appropriate identification in the Notice. In any event,

information contained in proposals will be protected to the extent permitted by law, but NASA assumes no liability for use and disclosure of information not made subject to the Notice.

Notice

Restriction on Use and Disclosure of Proposal Information

The information (data) contained in [insert page numbers or other identification] of this proposal constitutes a trade secret and/or information that is commercial or financial and confidential or privileged. It is furnished to the Government in confidence with the understanding that it will not, without permission of the offeror, be used or disclosed other than for evaluation purposes; provided, however, that in the event a contract(or other agreement) is awarded on the basis of this proposal, the Government shall have the right to use and disclose this information (data) to the extent provided in the contract(or other agreement). This restriction does not limit the Government's right to use or disclose this information (data) if obtained from another source without restriction.

(3) *Abstract.* Include a concise (200-300 word if not otherwise specified in the NRA) abstract describing the objective and the method of approach.

(4) *Project Description.*

(i) The main body of the proposal shall be a detailed statement of the work to be undertaken and should include objectives and expected significance, relation to the present state of knowledge, and relation to previous work done on the project and to related work in progress elsewhere. The statement should outline the plan of work, including the broad design of experiments to be undertaken and a description of experimental methods and procedures. The project description should address the evaluation factors in these instructions and any specific factors in the NRA. Any substantial collaboration with individuals not referred to in the budget or use of consultants should be described. Subcontracting significant portions of a research project is discouraged.

(ii) When it is expected that the effort will require more than one year, the proposal should cover the complete project to the extent that it can be reasonably anticipated. Principal emphasis should be on the first year of work, and the description should distinguish clearly between the first year's work and work planned for subsequent years.

(5) *Management Approach.* For large or complex efforts involving interactions among numerous individuals or other organizations, plans for distribution of responsibilities and arrangements for ensuring a coordinated effort should be described.

(6) *Personnel.* The principal investigator is responsible for supervision of the work and participates in the conduct of the research regardless of whether or not compensated under the award. A short biographical sketch of the principal investigator, a list of principal publications, and any exceptional qualifications should be included. Omit social security

number and other personal items which do not merit consideration in evaluation of the proposal. Give similar biographical information on other senior professional personnel who will be directly associated with the project. Give the names and titles of any other scientists and technical personnel associated substantially with the project in an advisory capacity. Universities should list the approximate number of students or other assistants, together with information as to their level of academic attainment. Any special industry-university cooperative arrangements should be described.

(7) *Facilities and Equipment.*

(i) Describe available facilities and major items of equipment especially adapted or suited to the proposed project, and any additional major equipment that will be required. Identify any Government-owned facilities, industrial plant equipment, or special tooling that are proposed for use. Include evidence of its availability and the cognizant Government points of contact.

(ii) Before requesting a major item of capital equipment, the proposer should determine if sharing or loan of equipment already within the organization is a feasible alternative. Where such arrangements cannot be made, the proposal should so state. The need for items that typically can be used for research and non research purposes should be explained.

(8) *Proposed Costs.*

(i) Proposals should contain cost and technical parts in one volume: do not use separate "confidential" salary pages. As applicable, include separate cost estimates for salaries and wages, fringe benefits, equipment, expendable materials and supplies, services, domestic and foreign travel, ADP expenses, publication or page charges, consultants, subcontracts, other miscellaneous identifiable direct costs, and indirect costs. List salaries and wages in appropriate organizational categories (e.g., principal investigator, other scientific and engineering professionals, graduate students, research assistants, and technicians and other non-professional personnel). Estimate all staffing data in terms of staff-months or fractions of full-time.

(ii) Explanatory notes should accompany the cost proposal to provide identification and estimated cost of major capital equipment items to be acquired, purpose and estimated number and lengths of trips planned, basis for indirect cost computation(including date of most recent negotiation and cognizant agency), and clarification of other items in the cost proposal that are not self-evident. List estimated expenses as yearly requirements by major work phases.

(iii) Allowable costs are governed by FAR Part 31 and the NASA FAR Supplement Part 1831(and OMB Circulars A-21 for educational institutions and A-122 for nonprofit organizations).

(9) *Security*. Proposals should not contain security classified material. If the research requires access to or may generate security classified information, the submitter will be required to comply with Government security regulations.

(10) *Current Support*. For other current projects being conducted by the principal investigator, provide title of project, sponsoring agency, and ending date.

(11) *Special Matters*.

(i) Include any required statements of environmental impact of the research, human subject or animal care provisions, conflict of interest, or on such other topics as may be required by the nature of the effort and current statutes, executive orders, or other current Government-wide guidelines.

(ii) Proposers should include a brief description of the organization, its facilities, and previous work experience in the field of the proposal. Identify the cognizant Government audit agency, inspection agency, and administrative contracting officer, when applicable.

D. Renewal Proposals

(1) Renewal proposals for existing awards will be considered in the same manner as proposals for new endeavors. A renewal proposal should not repeat all of the information that was in the original proposal. The renewal proposal should refer to its predecessor, update the parts that are no longer current, and indicate what elements of the research are expected to be covered during the period for which support is desired. A description of any significant findings since the most recent progress report should be included. The renewal proposal should treat, in reasonable detail, the plans for the next period, contain a cost estimate, and otherwise adhere to these instructions.

(2) NASA may renew an effort either through amendment of an existing contract or by a new award.

E. Length. Unless otherwise specified in the NRA, effort should be made to keep proposals as brief as possible, concentrating on substantive material. Few proposals need exceed 15-20 pages. Necessary detailed information, such as reprints, should be included as attachments. A complete set of attachments is necessary for each copy of the proposal. As proposals are not returned, avoid use of "one-of-a-kind" attachments.

F. Joint Proposals.

(1) Where multiple organizations are involved, the proposal may be submitted by only one of them. It should clearly describe the role to be played by the other organizations and indicate the legal and managerial arrangements contemplated. In other instances, simultaneous submission of related proposals from each organization might be appropriate, in which case parallel awards would be made.

(2) Where a project of a cooperative nature with NASA is contemplated, describe the contributions expected from any participating NASA investigator and agency facilities or equipment which may be required. The proposal must be confined only to that which the proposing organization can commit itself. "Joint" proposals which specify the internal arrangements NASA will actually make are not acceptable as a means of establishing an agency commitment.

G. Late Proposals. A proposal or modification received after the date or dates specified in an NRA may be considered if doing so is in the best interests of the Government.

H. Withdrawal. Proposals may be withdrawn by the proposer at any time before award. Offerors are requested to notify NASA if the proposal is funded by another organization or of other changed circumstances which dictate termination of evaluation.

I. Evaluation Factors

(1) Unless otherwise specified in the NRA, the principal elements (of approximately equal weight) considered in evaluating a proposal are its relevance to NASA's objectives, intrinsic merit, and cost.

(2) Evaluation of a proposal's relevance to NASA's objectives includes the consideration of the potential contribution of the effort to NASA's mission.

(3) Evaluation of its intrinsic merit includes the consideration of the following factors of equal importance:

(i) Overall scientific or technical merit of the proposal or unique and innovative methods, approaches, or concepts demonstrated by the proposal.

(ii) Offeror's capabilities, related experience, facilities, techniques, or unique combinations of these which are integral factors for achieving the proposal objectives.

(iii) The qualifications, capabilities, and experience of the proposed principal investigator, team leader, or key personnel critical in achieving the proposal objectives.

(iv) Overall standing among similar proposals and/or evaluation against the state-of-the-art.

(4) Evaluation of the cost of a proposed effort may include the realism and reasonableness of the proposed cost and available funds.

J. Evaluation Techniques. Selection decisions will be made following peer and/or scientific review of the proposals. Several evaluation techniques are regularly used within NASA. In all cases, proposals are subject to scientific review by discipline specialists in the area of the proposal. Some proposals are reviewed entirely in-house, others are evaluated by a combination of in-house and selected external reviewers, while yet others are subject to the full external peer

review technique (with due regard for conflict-of-interest and protection of proposal information), such as by mail or through assembled panels. The final decisions are made by a NASA selecting official. A proposal which is scientifically and programmatically meritorious, but not selected for award during its initial review, may be included in subsequent reviews unless the proposer requests otherwise.

K. Selection for Award.

(1) When a proposal is not selected for award, the proposer will be notified. NASA will explain generally why the proposal was not selected. Proposers desiring additional information may contact the selecting official who will arrange a debriefing.

(2) When a proposal is selected for award, negotiation and award will be handled by the procurement office in the funding installation. The proposal is used as the basis for negotiation. The contracting officer may request certain business data and may forward a model award instrument and other information pertinent to negotiation.

L. Cancellation of NRA. NASA reserves the right to make no awards under this NRA and to cancel this NRA. NASA assumes no liability for canceling the NRA or for anyone's failure to receive actual notice of cancellation.

(End of provision)

Additional Information Regarding Proposal Submission, Evaluation, Selection, and Implementation

The information contained in Appendix C augments and supersedes Appendix B and applies only to this NRA.

C.1 Proposal Preparation and Submission

C.1.1 General Observing Parameters

The current NRA covers the 12 months of observations to be carried out with RXTE beginning approximately January 1, 1998. These observations will be selected from proposals submitted to NASA in response to this NRA.

Once the targets to be observed are identified, the Science Operations Center (SOC) is responsible for generating the science time-line under the specified constraints. Under normal operating conditions, the only constraint is the angle between the target and the Sun, which must be larger than 30° . Proposers may specify additional constraints on their observation. Maneuvers are scheduled to occur during passage of the spacecraft through the South Atlantic Anomaly (SAA) or, where possible, when the target is occulted by the Earth. Large maneuvers occur at ~ 6 degrees per minute, and a typical maneuver between unrelated targets incurs approximately 500 seconds of overhead. Approximately 20 maneuvers per day can be performed. These values may change as a result of further in-orbit experience. Scans of extended targets can be made at lower slew rates. There are no restrictions regarding the amount of observing time or the number of targets that may be requested. Proposals may be submitted for single targets with short or long observation times, or for larger programs involving multiple targets or significant amounts of observing time. All proposals will be reviewed in the same peer review and that should result in the selection of a mix of large, medium, and small programs (for approximate definitions of large, medium, and small, see Section C.3.1.2). There are no specified key projects for RXTE. Proposers may request observations extending beyond the end of the formal 1-year period covered by this NRA, but must present compelling scientific justification for such observations. For the current observing cycle, it is anticipated that observing time will be awarded to about 100 proposals.

RXTE can respond quickly to the transient behavior of astronomical sources, so the exact scheduling of time-critical observations may be done only a few days or weeks prior to the observation. One of the primary design criteria for RXTE was the rapid response to Targets of Opportunity (TOO's). Proposals to observe TOO's are allowed under this NRA. Such observations can be triggered either by a change in flux as measured by the ASM, or by optical, radio, or other external triggers. Changes in ASM flux will be detected in the SOC. For external triggers, it is the responsibility of the Principal Investigator to notify the SOC that the triggering

event has occurred. When a TOO is triggered and approved by the RXTE Project Scientist, a repointing of the satellite can be effected in as short a time as seven hours from the time of notification. Data rights from a TOO proposal that has been peer reviewed and approved in response to this NRA are identical to those of a non-TOO proposal that has been peer reviewed and approved in response to this NRA. Further details on proposing Targets of Opportunity can be found in the RXTE Technical Description (available from the RXTE GOF) and on the RXTE GOF web site at the addresses given in the Solicitation Announcement.

One advantage of this mission in comparison to previous missions is the relatively unconstrained solar angle constraint that makes available approximately 93% of the sky at any given time. The large sky accessibility affords an opportunity for coordinated ground-based and RXTE observing, as a given target can be scheduled for observations during night-time hours at ground-based telescopes. Up to 4 coordinated observations per month will be designated for “special handling” by the peer review panel. Observations with this designation will be assigned a high priority for matching the requested coordinated observing times. There is no limit on the proportion of observations that can be accepted that include time, phase, or other observing constraints.

C.1.2 Who May Propose

Proposals may be accepted from any institution within or outside the United States. RXTE proposals must identify a Principal Investigator (PI), who assumes full responsibility for the budget and the conduct of the scientific investigation.

Following selection, the SOC will communicate only with the person identified as PI or lead Co-Investigator (Co-I), who can also serve in this role in the event that the PI is unavailable. It will be the PI’s responsibility to respond to any questions concerning observational constraints or configurations.

C.1.3 Who May Propose -- Foreign Participation

NASA welcomes proposals from outside the U.S. However, investigators working outside the U.S. are not eligible for funding from NASA. Proposals from non-U.S. entities should not include a cost plan. Proposals from outside the U.S. and U.S. proposals that include non-U.S. participation must be endorsed by the respective government agency or funding/sponsoring institution in the country from which the non-U.S. participant is proposing. Such endorsement should indicate that the proposal merits careful consideration by NASA and, if the proposal is selected, that sufficient funds will be made available to undertake the activity as proposed.

In addition to sending 20 copies of the proposal to the address given in the Solicitation Announcement, one copy of the proposal, along with the Letter of Endorsement from the sponsoring non-U.S. agency must be forwarded to:

Ms. Bettye Jones
Ref: NRA 97-OSS-09
International Science and Aeronautics Division
Code IS
NASA Headquarters
Washington, DC 20546-0001
USA

All proposals must be typewritten in English. All non-U.S. proposals will undergo the same evaluation and selection process as those originating in the U.S. All proposals must be received before the established closing date; those received after the closing date will be held for the next proposal cycle. Sponsoring non-U.S. agencies may, in exceptional situations, forward a proposal without endorsement to the submission address if endorsement is not possible before the announced closing date. In such cases, however, NASA's International Science and Aeronautics Division should be advised when a decision on endorsement can be expected.

Successful and unsuccessful proposers will be contacted directly by the NASA Research Program Management Division. Copies of the letters of notification will be sent to the sponsoring government agency. Should a non-U.S. proposal or a U.S. proposal with non-U.S. participation be selected, NASA's International Science and Aeronautics Division will arrange with the non-U.S. sponsoring agency for the proposed participation on a no-exchange-of-funds basis, in which NASA and the non-U.S. sponsoring agency will each bear the cost of discharging their respective responsibilities. Depending on the nature and extent of the proposed cooperation, these arrangements may entail:

- a letter of notification by NASA; and
- an exchange of letters between NASA and the sponsoring governmental agency, or
- a formal Agency-to-Agency Memorandum of Understanding (MOU).

C.2 Proposal Format and Content

C.2.1 Overview

The proposal review procedure will be conducted in two stages to minimize the burden of proposal preparation. During the first part, the scientific and technical merits of the proposed investigation will be reviewed, including the appropriateness of using RXTE to address the scientific objectives and its relevance to furthering our understanding of high energy astrophysical processes. Based upon the criteria listed in Section C.3, a panel of scientific peers will evaluate the scientific and technical merits of proposals received in response to this NRA. Based upon the results of this Stage 1 review (scientific and technical review), the RXTE Program Scientist at NASA Headquarters will recommend a set of proposals to be considered for

award of observing time during Cycle 3. The PI's of these proposals will then be asked to submit a cost proposal for the Stage 2 review (cost review). A subset of the Stage 1 panel will then evaluate the cost proposals. Based upon overall consideration of both scientific and cost factors, the RXTE Program Scientist will recommend a set of proposals for consideration by the Selecting Official for final selection and award. The second review will take place approximately 4-6 weeks after the end of the Stage 1 review. Following the second review, those proposers selected for award will be notified of the recommended funding level for their investigation.

C.2.2 Stage 1 Proposal Details

C.2.2.1 Proposal Content

The Stage 1 proposal must include a standard Cover Page form, a General Form, the scientific and technical justification (as described below), a Target Summary form, Target Forms as needed, and, optionally, Constraints Forms as needed (see Appendix D). The information in the forms will be entered into a data base that will be used in cataloguing and evaluating proposals. The forms must be completed in the format presented. Cost sections should not be submitted for the Stage 1 scientific and technical review. Cost information will not be considered at any time during the Stage 1 review.

The abstract should be limited to 800 characters, including spaces between words, with no embedded commands, i.e., flat ASCII only. Abstracts that exceed this length will be truncated automatically at 800 characters when entered into the data base. Abstracts and target lists for selected proposals will be made available on publicly accessible data bases.

Proposers should also note that the pointing positions given in the Target Form will be used to point the spacecraft and that care must be exercised in stating these positions. Slight pointing errors can seriously degrade the data from an observation. Positions must be stated in equinox/epoch 2000.

A target number should be assigned to each proposed pointing to designate the priority of that particular pointing within an investigation requiring multiple pointings. If it is necessary for the peer-review committee to reduce observing times, an attempt will be made to preserve the highest priority observations.

The discussion of the scientific investigation should provide the following information and be structured as follows:

- (1) **Scientific Problem**. Clearly state the scientific problem to be addressed, with relevant scientific background and references to previous work. Show how the proposed RXTE observations and subsequent data analyses are expected to address the problem and advance prior knowledge in the context of past work in this research area. Justify the use of RXTE for the proposed investigation by showing how the observations use the unique strengths and capabilities of RXTE.

- (2) Technical Feasibility. Show how the requested observations (exposure time, telemetry requirements, etc.) make possible the achievement of the scientific objectives. State how targets or pointing locations were selected. List assumptions about source intensity, surface brightness, and spectrum. Estimates of both count rates and total counts needed for the investigation must be provided. At a minimum, the Portable Interactive Multi-Mission Simulator (PIMMS — see the RXTE Technical Description, available from the RXTE GOF) should be used to estimate count rates; the spectral fitting software XSPEC can be used to show how the spectral data will be analyzed. Timing simulations are strongly encouraged. Note that it is in the proposer's best interest to provide enough detail to allow a reviewer to understand the proposer's target brightness assumptions and to reproduce the count estimates. The proposer should demonstrate that those estimated counts are sufficient to extract the desired astrophysics from the observation. RXTE has numerous data processing configurations and the user must select the configurations for the on-board processing of the data stream for his or her proposed observations. It is the proposer's responsibility to be knowledgeable of the configurations and their limitations (suggested text length: one page).
- (3) Constrained Observations. The proposer may desire to place constraints (monitoring, coordinated with observations at other wavelengths, uninterrupted, etc.) on the proposed observations. A coordinated observation can be designated for "special handling." However, this designation places increased emphasis on matching the absolute coordinated schedule; a change in the coordinated schedule can be accommodated up to 60 days in advance of the observation. Up to 4 "special handling" requests per month will be considered, so such constraints must be demonstrated as feasible and scientifically justified. Targets of Opportunity (TOO) may be proposed, and further details about the special requirements of such proposals can be found in Section C.3. Alternate targets, defined as a substitute for the primary target if the primary target becomes scientifically uninteresting (e.g., becomes too faint), are permitted. Alternate targets impose operational burdens on RXTE. Their implementation is restricted; the restrictions are defined in Chapter 2 of the RXTE Technical Description (available from the RXTE GOF). Proposers should also note the potential impact on time-constrained observations of an interruption by a TOO.
- (4) Justification of Telemetry Use. Requests for telemetry beyond the nominal rates for each instrument must be justified due to the constrained nature of this resource. Similarly, rates significantly below these allocations may be viewed as an under-utilization of RXTE and should be justified. The allocated, nominal rates are, assuming an observing efficiency of ~60%, ~40 kbits/sec for the PCA, and ~8 kbits/s for the HEXTE. The proposer is also invited to discuss, within the page restrictions described below, possible uses of increased telemetry if additional telemetry were to become available. In particular, the proposer may specify the key parameter (temporal resolution, spectral resolution, layer ID, etc.) to alter in the instrument configurations if such an increase in telemetry were found to be feasible during his/her observation.

C.2.2.2 Page Restrictions, Certifications, and Quantity

As a result of the large number of proposals anticipated in response to this NRA, strict page limits will be enforced. The scientific justification should consist of not more than four pages where each side of a sheet of paper with text or figures is considered a page. Type should not be smaller than 10 point (standard typewriter size print) and is limited to not more than 55 lines per page. Margins should be a minimum of 1 inch on all sides. These four pages and the Target Form(s) comprise the scientific proposal and should provide the peer panel members with the essence of the proposed scientific investigation.

The scientific and technical sections and all relevant forms that comprise the proposal should be stapled together in one document without cardboard covers, plastic bindings, or other features. Twenty copies of the proposal should be sent to the address listed in the Solicitation Announcement. Scientific justifications are not to be submitted electronically. *Proposals printed double-sided are encouraged but not required.*

Reviewers will consider only those pages in each proposal section that do not exceed the page limits specified below.

<u>Section</u>	<u>Page Limit</u>	<u>Comments</u>
Cover Page	1	no other cover necessary
General Form	1	
Target Summary	1	
Target Forms	1 or more	as needed
Constraints Forms	1 or more	optional, as needed
Scientific Problem and Technical Feasibility	4	includes text, figures, charts, tables, references
Vita of PI	1	optional

C.2.2.3 Technical Information Resource

Technical questions concerning the RXTE mission and requests for assistance in proposal submission may be addressed to Dr. Alan Smale, RXTE GOF Manager, at:

Dr. Alan Smale
RXTE Guest Observer Facility
Code 660.2
Goddard Space Flight Center
National Aeronautics and Space Administration
Greenbelt, MD 20771-0001 USA
TEL: 301-286-7063, FAX: 301-286-1682
E-mail: xtehelp@athena.gsfc.nasa.gov

C.2.2.4 Electronic Forms Submission

All proposers must electronically submit their Cover Page, General Form, Target Summary, Target Forms, and Constraints Forms. Proposers who do not have access to electronic communications must contact Dr. Smale at the above address no later than two weeks before the submission deadline. Electronic submission facilitates efficient proposal processing and reduces the likelihood of the introduction of transcription errors into the proposal and observation databases. For electronic forms submission, the RXTE Guest Observer Facility has made available Remote Proposal Software (RPS) (see Appendix D). Additional information on RPS is available on the RXTE anonymous FTP account at <legacy.gsfc.nasa.gov> or from the RXTE web site at <http://heasarc.gsfc.nasa.gov/docs/xte/xte_1st.html>.

C.2.3 Stage 2 Cost Proposal Details

A cost proposal will be requested for all successful proposed investigations that pass the Stage 1 review and that require financial support from NASA. As part of the proposal and corresponding budget for an RXTE investigation, proposers may request support for correlative observations at other wavelengths. Funding for such correlative studies will be considered only insofar as they directly support a specific investigation using RXTE. U.S. PI's are responsible for approving the requested budgets of their co-investigators. Funding may be solicited to support the visit to a U.S. institution of a non-U.S. co-I, however, the visit to a U.S. institution of a non-U.S. PI must be supported by their national entity.

Proposers should use the enclosed budget forms; alternatively, the cost proposal may be prepared according to the guidelines of the institution submitting the proposal, but it must contain:

- A complete list of all awarded or pending research funding support from NASA or other sources for the Principal Investigator and Co-Investigators. The information needed includes: Agency, Grant/Contract Number, Title, Amount, Starting and Ending Dates, and Level of Effort (percent).
- A detailed breakdown of the responsibilities of the various investigators taking part in the proposed study.
- Cost estimates for direct labor, including individual person-months and rates for the personnel involved.
- Estimated costs for equipment, materials, and computer services, including type of computer and number of hours of mainframe computer use. Itemize items over \$500. See below for additional information on workstation requests.
- Estimated travel costs by itemizing trips, including travel to data analysis centers. In general, only one trip per team member to a professional society meeting will be supported.
- Overhead rates and costs.
- Other costs, with explanation.
- Contributions from any cost-sharing plan.
- Total cost of support being requested from NASA.

To assure compatibility with NASA's data systems, requested workstation systems must be capable of supporting existing portable data analysis environments such as the RXTE analysis software FTOOLS; FTOOLS is supported on a range of platforms and operating systems including Unix and Linux. In addition, requested computer system should contain about 32 Megabytes of RAM and several Gigabytes of hard disk storage. Requests for workstations must be justified in the text of both the science and technical portion of the proposal and the budget explanation. Such justification should briefly describe the computing capabilities that exist, or are expected to exist, at the proposer's institution during the period in which the proposed research would be performed, and then explain the scientific impact to the proposed work if the request for the additional workstation is declined. The budget request for workstations must be clearly stated in the Budget Summary form as a line item (on line D, Equipment). Regardless of whether a workstation is included in the proposal, the first and most important criterion for the acceptance of a proposal will be the scientific and technical merit of the proposed investigation.

C.3 Proposal Evaluation, Selection, and Implementation

C.3.1 Stage 1 Proposals

C.3.1.1 Evaluation Criteria

The following criteria supersede the criteria given in Appendix B. They apply only to the evaluation of proposals submitted in response to this NRA and are shown in descending order of priority.

- The overall scientific merit of the investigation.
- The suitability of using the RXTE observatory and data products for the proposed investigation; the degree to which the investigation uses RXTE's unique capabilities; the feasibility of accomplishing the objectives of the investigation within the time, telemetry, and scheduling constraints; and the feasibility of the analysis techniques.
- The relevance of the proposed research to NASA's space science program.
- The competence and relevant experience of the Principal Investigator and any collaborators as an indication of their ability to carry the investigation to a successful conclusion. Past performance in scientific research, as evidenced by the timely publication of articles in refereed scientific journals, will be considered.
- The cost of the investigation, including cost reasonableness and total proposed cost in relation to available funds (Stage 2 review only).

C.3.1.2 Proposal Selection

RXTE proposals will be evaluated by a scientific and technical review panel convened by NASA. All proposals submitted in response to this NRA and received by the proposal deadline will be evaluated for scientific merit and for technical feasibility with respect to spacecraft and observational constraints. From experience with previous solicitations, a substantial oversubscription of RXTE observing time and available telemetry is expected.

To aid in prioritizing investigations, proposals will be assigned a numerical grade by the peer evaluation panel. Proposed observing programs must receive a high ranking to be considered for

selection. The detailed observing plan (timeline) will be formulated and implemented by the SOC. It is the intent of NASA that all selected observing programs be carried out, although scheduling constraints and TOO observations may require rescheduling some observations. Proposers need not repropose if a selected observing program is not carried out during the current NRA period. Note that in accordance with established RXTE policy, proposers of Cycle 2 TOO observations will be required to repropose their observing programs if the TOO has not been carried out during the Cycle 2 period. Similarly, successful proposers of Cycle 3 TOO observations will be required to repropose their observing programs if the TOO is not carried out during the third observing cycle.

Since RXTE has so many possible instrument configurations, and many of the targets that RXTE will observe are expected to vary with time, it is expected that individual targets may be observed many times without exhausting the science that can be obtained. The peer evaluation panel will judge whether a proposed observational program essentially duplicates one or more observations made earlier, including those performed during the IOC period. The peer evaluation panel may recommend that two or more proposals from different investigators to observe the same source be scheduled, if the proposals have sufficiently high scientific merit. Requests from an investigator to observe a particular source more than once or to observe multiple sources with the same scientific goal should generally be made in a single proposal. Separate proposals to observe the same source more than once, each time with different scientific goals, are acceptable if the goals could not be attained simultaneously in a single observation. The acceptance of a scientific target in previous cycles does not preclude it from being proposed (or repropose) in this cycle. Scientific justification must be provided in each of the situations described above.

NASA expects to award comparable amounts of observing time to large (with total observing time ~12 days or more), medium (with total observing time ~1-12 days), and small (with total observing time <1 day) programs. The definition of large, medium, and small may be adjusted based upon the amounts of time requested.

C.3.1.3 Implementation of Approved Observing Programs

All approved targets will be placed into an observation database. Each observation will be assigned a unique identifying number. It is the responsibility of the RXTE mission planning and operations team at the RXTE Science Operations Facility (SOF) to produce a mission timeline out of all approved observation requests. The process of mission timeline generation is split into two parts: first, for the entire period covered by this NRA, a long-term mission timeline (LMTL) will be generated with a precision of about a week. Additional LMTL's will be generated in response to TOO's and other timeline changes as necessary. Second, about three weeks prior to the execution of the observations, a short-term mission timeline (SMTL) will be produced on the basis of the LMTL. The SMTL is used for the automatic generation of the required spacecraft commands. It will be optimized a final time approximately one week prior to the start of a particular observation.

Targets are scheduled in the LMTL to achieve maximum efficiency in the observing program within the operational constraints of RXTE. Unconstrained observations are thus scheduled to

produce the highest observing efficiency. Any observation requiring time constraints will be designated as “time critical” and its priority in scheduling will be related to its peer review grade.

The SOF will make its best effort to schedule all approved observations. All observations that are not scheduled or that were scheduled but not successfully executed for whatever reason will automatically be rescheduled within the current NRA period. Approved non-TOO observations will be carried over into the observing program of the next observing cycle. Approved TOO observations will not be carried into the next NRA period.

If observations are cut short by mission timeline optimization or other constraints, the completeness criterion will determine whether a given target is scheduled for additional observing time. The completion criterion for each requested pointing with RXTE is 80% of the recommended exposure time, regardless of the grade assigned to the corresponding proposal by the peer evaluation panel.

Any constraint on the scheduling of observations must be stated and justified. SAA passage and Earth occultation will, of course, interrupt the average observation. Long observations of low telemetry usage will likely be interspersed with high telemetry rate, short observations. Observers who desire uninterrupted observations may set the “uninterrupted” constraint flag, but must justify the scientific necessity and must show that the observation is feasible.

Users should also note that a prime purpose of RXTE is the capability to respond to Targets of Opportunity (TOO’s). Any observation may be interrupted by a TOO. The priority grade assigned to a target will indicate the susceptibility to interruption likely for that target. High-priority, time-critical targets will have the least chance of interruption by a TOO (but still not zero). Interrupted observations will be completed at a later time. Note that proposers are not permitted to propose a TOO that would be triggered by PCA or HEXTE data that is proprietary to another observer. They may, however, propose a TOO that may be triggered by PCA or HEXTE slew data, by RXTE ASM or BATSE data, or other means.

Proposers should state in their justification their estimated probability that the TOO trigger will occur during the observing period covered by this NRA, and how they arrived at this estimate. To simplify the proposal evaluation process, *proposals must not contain a mix of TOO targets and non-TOO targets.*

Investigators whose proposals are selected will have proprietary use of their data for 12 months after receipt of the data in usable form, after which time the data will be placed in the public domain via the RXTE data archive.

C.3.2 Stage 2 Proposal Evaluation and Selection

Approximately 30 days after notification of the tentative selection of an investigation in the Stage 1 review, cost proposals from those proposers will be due. A suggested Budget Summary form is included in Appendix D of this NRA. A review team comprised of a subset of the Stage 1 peer evaluation panel will then review the cost proposals for overall consideration of both scientific and cost factors. Based on this evaluation, the RXTE Program Scientist will recommend a set of

proposals to the Selecting Official for final selection and award. In addition to the overall scientific/technical rating of the proposed investigation from the Stage 1 review, the primary criterion used in the Stage 2 evaluation will be the cost of the investigation, including cost reasonableness (in the context of the anticipated level of effort required to carry out the investigation successfully), and total proposed cost in relation to available funds.

The total amount of funding available for the support of Guest Observers for the present observing opportunity is anticipated to be approximately \$1 million. The total amount awarded is contingent on the availability of appropriated funds from which payment for award purposes can be made and the receipt of proposals which are acceptable for award under this NRA. It is anticipated that approximately 100 investigations will be recommended for selection. Successful proposers will be notified concerning the level of funding recommended for their investigation shortly after the Stage 2 review.

C.4 Schedule

The current schedule for the review and selection of proposals for the third observing cycle on RXTE is listed below. Note that the dates of events planned beyond the Proposal Due Date are estimates and subject to change.

<u>Date</u>	<u>Action</u>
May 26, 1997	Release of this NRA
September 5, 1997	Proposals Due
November 8-10, 1997	Stage 1 review; scheduling commences
December 1, 1997	Cost Proposals Due
January 1, 1998	Begin Cycle 3 Observations

Proposals may be submitted at any time during the period prior to the Proposal Due Date. Proposals received after the due date will be held for the next review cycle.

C.5 Education and Public Outreach

“Partners in Education: A Strategy for Integrating Education and Public Outreach Into NASA’s Space Science Programs (March 1995)” describes the Office of Space Science’s approach for making education at all levels and the enhancement of the public understanding of science integral parts of space science research activities. Education and public outreach are now expected to be a part of each flight program and research discipline. The follow-on implementation plan, entitled “Implementing the Office of Space Science (OSS) Education/Public Outreach Strategy”, produced by the Education/Public Outreach Task Force of the Space Science Advisory Committee (SScAC), was published October 15, 1996. It may be obtained from Dr. Jeffrey D. Rosendhal, Office of Space Science, Code S, NASA Headquarters, Washington DC 20546-0001, or by opening “Publications” on the OSS homepage at <<http://www.hq.nasa.gov/office/oss/>>.

In accordance with the policies in the OSS education strategy and the recommendations in the implementation plan, proposers are encouraged (but not required) to include education/public outreach activities in their proposals. Budgets comparable to those given through the IDEA

program (described below) would be appropriate for such activities. Scientific excellence of proposal investigations will continue to be the primary selection criterion. Proposals will not be selected solely or primarily on the strength of their education/outreach components, although the quality of a proposed education/outreach effort could be used as an additional factor in selecting among otherwise equal and scientifically excellent proposals. Educational components of those proposals being considered for selection on the basis of their scientific and technical merit will be evaluated by education professionals. Evaluation criteria for education components will include:

- The educational effectiveness and realism of program concern.
- Existence of effective partnerships with educational institutions and/or educators.
- Effective leveraging of existing resources and the prospects for the program to have a multiplier effect.
- Capability of proposers to carry out a proposed program.
- Consistency with national education reform efforts.
- Realism of budget.

Attention is also called to the program entitled “Initiative to Develop Education through Astronomy (IDEA)” that is administered on behalf of OSS by the Space Telescope Science Institute. This program provides small grants (typically \$6,000, but may range up to \$20,000) to enhance participation of space scientists in precollege or public outreach activities. A call for proposals for the IDEA program is issued annually. For more information, contact Dr. Anne Kinney, Project Scientist for Education, Space Telescope Science Institute, 3700 San Martin Drive, Baltimore, MD 21218.

Filling Out RXTE Proposal Forms

D.1 Introduction and Instructions for Individual Forms

RXTE proposals must contain hard copies of four forms: the Cover Page, the General Form, the Target Summary, and a Target Form for each target proposed. Optional forms include one or more Constraints Forms. While it is preferred that budgetary information required for the Stage 2 evaluation be provided via the Budget Summary provided, use of this form is not required. This document is meant to provide guidance in filling out those entries on the various forms that are not self-explanatory. Additional information may be found in the RXTE Technical Description, which was previously released as Appendix F of earlier the RXTE Cycle 1 NRA and is available from the RXTE GOF by request or through the RXTE GOF homepage at the addresses given in the Solicitation Announcement.

For Stage 1, electronic submission of the Cover Page, General Form, Target Summary, Target Forms, and optional Constraints Forms is also required. For Stage 2, electronic submission of the Budget Summary is not required or supported. Individuals not having access to the Internet should contact Dr. Alan Smale at least two weeks prior to the proposal due date at the address given in the Solicitation Announcement.

The RXTE GOF provides the capability to submit forms electronically and, at the same time, to generate hard copy output, by the use of the Remote Proposal Submission (RPS) software. This software provides a “user friendly” means of entering, checking, electronically mailing, and printing of the proposal forms, and can be accessed via the WWW or by automated E-mail interaction. A description of the use of the software is available via the GOF homepage at http://heasarc.gsfc.nasa.gov/docs/xte/xte_1st.html and from the anonymous FTP account on [legacy.gsfc.nasa.gov](ftp://legacy.gsfc.nasa.gov).

While the RPS software package is now mature, it may still contain subtle undetected bugs. In addition, network glitches may occasionally affect the integrity of files. The proposal author is, strongly urged to verify the contents of the electronic RPS files prior to submitting proposals by printing out the forms and reading them carefully.

Please note that the proposal process is in two stages, as explained in Appendix C. The Budget Summary is not to be submitted during Stage 1 of the proposal review.

D.2 Cover Page

Most items on this form are self-explanatory, but there are a few items which are commonly filled out incorrectly. Please refer to the following sections for hints on the proper completion of the forms.

D.2.1 Principal Investigator

Title is not meant to refer to one's job description, but instead Dr., Prof., Mr., Ms., or whatever is appropriate.

D.2.2 Preferred Data Distribution Medium

Please indicate one preferred medium. The default is currently 2GB 8mm tape. Other choices are 5GB 8mm, 2GB DAT, and 4GB DAT.

D.2.3 Subject Category

Please enter the one entry that best describes the observation. The choice does not affect how the proposal is judged. The proposals are assigned to a review panel on the basis of whether the proposal is a galactic or an extragalactic proposal. The subject categories are chosen so the number of proposals received in a given category can be distributed evenly among panel members who are familiar with the targets in that category. The user should make a reasonable category choice for the proposal.

The categories are:

- Stars
- Cataclysmic Variables
- Pulsars
- Black Hole Candidates
- Low Mass X-ray Binaries
- High Mass X-ray Binaries
- Galactic Diffuse Radiation and Supernova Remnants
- Active Galactic Nuclei
- Galaxies, Clusters, and Extragalactic Large-Scale Structure
- Other

D.2.4 Proposal Title

Please keep the title succinct; there is a 120-character limit.

D.2.5 Number of Targets

RPS fills this entry automatically. Raster targets count as a single target.

D.2.6 Targets of Opportunity

The box should be checked if the proposal requests Target of Opportunity (TOO) status. If the proposal is selected, time will be awarded but will remain unscheduled until the opportunity occurs. Note that it will be the proposer's responsibility to notify the SOC that the opportunity

has occurred if the ASM is not used as the trigger. Note also that a proposal must not contain a mix of TOO targets and non-TOO targets.

D.2.7 Abstract

The abstract must not exceed 800 characters and should be understandable to someone familiar with the field but not necessarily an expert. The abstracts of approved proposals will be made available on a publicly accessible data base.

D.3 General Form

D.3.1 Co-Investigator(s)

The first name on the list should be that Co-Investigator (Co-I) who can serve as an alternate contact if the PI is unavailable. Communication between the planning and operations teams and the PI or her/his designated contact may be necessary at any time prior to an observation. It is useful to list other Co-I's in decreasing order of participation in the proposed project. For instance, list first a graduate student or postdoctoral associate who is expected to perform the analysis (and who may have written the proposal) but who, for administrative reasons, was not allowed to be the PI.

D.3.2 Co-I Contact

If designation of a contact in addition to the PI is desired, enter "Y" and provide a network address and phone number. Such a contact's name should be that of the first listed Co-I. Naming such a contact is optional, but might be useful if a decision about observing modes must be made rapidly and the PI is unavailable.

D.4 Target Form / Target Summary

D.4.1 Target Number

Order targets by observing priority from highest to lowest (i.e., target 1 = highest priority). The review panels will be instructed to honor the stated priority if they find it necessary to recommend reduction in the number of targets. If the target is an alternate target (defined in Chapter 2 of the RXTE Technical Description), use a new target number but place a comment in the Remarks box that this target is an alternate target for target number X, where X is the number of the primary target.

D.4.2 Name

The name will be printed/transmitted in upper case. Please use commonly accepted names for objects (NGC xxxx; PKS xxxx+yy; Gxxxx.x+y.y) so that overlap checks are made easier.

D.4.3 Position

Use J2000 coordinates. The RXTE team will not be responsible for pointing errors due to incorrect or unprocessed coordinates. If proper motion is important, specify an epoch within the Cycle 3 observing period.

Enter coordinates carefully. Use leading zeroes when necessary. The software may not read the coordinates properly if leading zeroes are not present (e.g., enter 02 03 07 rather than 2 3 7).

D.4.4 Total Observing Time

The unit for this number is *kiloseconds*. Enter the total time spent on this target. The absolute minimum time for a pointing is 1 ksec.

Large maneuvers between unrelated targets will incur ~500 sec of overhead, on average. *The proposal review panel may factor in the estimated overhead* when assessing proposals that ask for a large number of short observations, to reflect the true scheduling cost of these observations on RXTE operations.

For scans or multiple visits, enter the summed time. Scans of extended targets at a reduced slew rate are possible; the ‘scan’ flag on the Target Form should be set. Details of the scan should be entered in the ‘Remarks’ box or on a separate page.

D.4.5 Number of Observations

The default entry is “1.” It should be more than one only if any constraints exist. If a constrained observation is requested, then the appropriate entries in the Constraints Form must be filled out. If a raster observation is requested, provide details in the “Remarks” section or on a separate page.

D.4.6 Additional Constraints

The default entry is “N.” If constraints exist, the Constraints Form must be filled out.

D.4.7 Estimated Counting Rates: PCA and HEXTE

Estimated counting rates in counts/sec are requested for both the PCA and HEXTE. The requested count rates are: (i) for the PCA: the total mean count rate across the RXTE band, the maximum and minimum count rates across the RXTE band, and mean count rates in six spectral bands, and (ii) for the HEXTE: the mean count rates in four spectral bands and maximum possible overall count rate. These counting rates will be used to review the appropriateness of the selected configurations. The counting rates in each band for a given model are available from Portable Interactive Multi-Mission Simulator (PIMMS). PIMMS is a software tool used for

estimating count rates for a specified model. It is described in the RXTE Technical Description and is available through the RXTE GOF web site or anonymous FTP.

D.4.8 PCA/EDS Mode/Configuration

The EDS has eight Event Analyzers (EA's). Two are used for the ASM, over which the user has no control. Two more are dedicated to the Standard Modes of the PCA and may not be altered. The remaining four EA's may be configured by the user.

The names and descriptions of the configurations are available in the RXTE Technical Description. In addition, a software tool, RECOMMD, is available to guide the user in selecting an appropriate configuration. RECOMMD will provide suggestions for the appropriate configuration; the user must then consider whether the recommended configurations are appropriate for the proposed science. Instructions for the use of RECOMMD may be found in the RXTE Technical Description and through the RXTE GOF web site.

The configuration must be specified as a string constant, as listed by RECOMMD or as described in the RXTE Technical Description. You do not need to enter a configuration in each box - many scientific investigations do not require all the EA's to be utilized. Enter "IDLE" in all PCA boxes for which you do not wish to specify a configuration.

Observations of the same target using different configurations that cannot be accommodated simultaneously are considered separate observations. The proper approach to filling in the target sheet is as follows: (1) for the first configuration set, enter the exposure time desired at the specified configuration(s), and (2) treat the second observation as a completely new target as far as the exposure and configuration are concerned. The target name and coordinates will be identical with the first target.

D.4.9 PCA Telemetry Rates

The estimated telemetry rate in kbits/sec should be entered in the box. RECOMMD provides associated telemetry rates for all configurations listed.

The telemetry rate is a precious resource for RXTE observations and one of its great strengths. The telemetry rate, during good science times, averaged over the entire NRA period, must be approximately 40 kbits/sec, assuming an average observing efficiency of 60%. This value is exclusive of the PCA/EDS Standard Modes, HEXTE, and spacecraft telemetry values. Individual proposal telemetry rates may be above or below this value. Telemetry rates above this average value must be justified.

D.4.10 HEXTE Configurations

The HEXTE instrument consists of two clusters. For normal operations, the clusters are used identically. Each cluster may be programmed independently, however. HEXTE contains its own data system for selecting and formatting the data. The HEXTE modes are defined in the HEXTE

instrument description chapter and the HEXTE feasibility chapter of the RXTE Technical Description. The low energy threshold acts as a lower level discriminator, so that photons below that energy are not detected within the instrument. The default value is 12 keV. The source dwell time is the source exposure time for each of the two on-source exposures, that, when combined with the off-source exposures, comprise the HEXTE rocking cycle; the default is 16 seconds. The switching angle is the angle to the off-source pointing; the default is $\pm 1.5^\circ$. These default values are subject to change at the discretion of the HEXTE team. Proposers who request DEFAULT values will automatically receive the HEXTE team's default values in effect at the time of their observation. Finally, a burst list capability exists to record events before, during, and immediately after a burst detected by the individual cluster, the other cluster, or the EDS. Ground-commanded triggers are also possible. IDLE is not a permitted configuration for HEXTE.

D.4.11 HEXTE Telemetry Rates

The estimated HEXTE telemetry rate should be entered in the box at the bottom of the HEXTE section. The average HEXTE data rate during the NRA period will be approximately 8 kbits/s, assuming an average observing efficiency of 60%. For most sources (those whose brightness is <70% of the Crab), this limit is respected by use of the Event List Mode for which full spectral and a range of temporal resolutions are preserved for analysis. Brighter sources will require tradeoffs between spectral and temporal resolutions. The Histogram Bin (spectral) or Multiscalar Bin (timing) modes are designed to provide such capabilities and to stay within telemetry limits. Telemetry rates above the average value must be justified.

D.4.12 Remarks

The Remarks box should be used to explain any entry that may not be clear to the scientific and technical review panels, or to the SOC staff. If an observation is particularly complex, use the Remarks box as an indicator that an additional page has been attached (e.g., "See additional page"). An additional page for remarks is not to be interpreted as extra space for scientific justification, technical feasibility, or advertisements. The Remarks box and the extra sheet of paper are for the purpose of explaining a technically demanding observation that cannot be otherwise covered by the Constraints Form.

D.5 Constraints Form

D.5.1 Target Number

The entry here will be identical to the entry placed on the Target Form. This form is generated by RPS so the target number must only be specified correctly at the initial query. PI's wishing to specify both high and low telemetry components of a particular target should propose these as two separate targets, with a comment in the Remarks section linking them.

D.5.2 Coordinated Observation

This category of constraint is intended for use for multibandpass observations. The entries consist of the starting and stopping times (Year, Month, Day, Hour, Minute) for the coordinated observation. The times should be absolute times (UT). Seasonal constraints may be handled in this category. Observations requesting “special handling” should set the flag. This flag emphasizes the importance of absolutely matching the coordinated observing schedule. The appropriateness of the flag will be reviewed by the peer evaluation committee. If an observing program is so designated, a change in the coordinated observing schedule will be accommodated up to 60 days prior to the start of the observation. If a target has multiple coordinated windows, such as an observation in March 1998 and another in September 1998, PI’s must propose these as two targets, with a comment in the Remarks section linking them.

D.5.3 Time-of-Day Observation

This category exists generally for ground-based collaboration to specify a UT time to start and to end the observation. The emphasis is slightly different from the Coordinated Observation, in that the observation may stretch over several nights and be done only during the Earth’s night-time hours from a given location (e.g., Kitt Peak).

D.5.4 Monitoring Observation

This category is intended for repeated visits to a particular target(s). The primary consideration is not when the observation is scheduled but the interval between visits. Note that the time interval must be specified as a minimum and a maximum interval, where the units are in kiloseconds, to permit the scheduling software some flexibility in producing the observing schedule. If PI’s wish to do (for example) both a daily and weekly monitoring campaign, these should be specified as two targets, with a comment in the Remarks section linking them. Monitoring campaigns with more complex structures, e.g. logarithmic separations, are still to be considered as a special case and must be specified entirely in the Remarks section.

D.5.5 Phase-Dependent Observation

This category is intended for observing at a particular phase of a periodic phenomenon. The epoch (MJD = Modified Julian Date) and the period (in days) must be specified. In addition, the phase range which the observation will cover must be specified as the starting and stopping phases (in other words, the observation will begin near the “start” phase and continue until approximately the “stop” phase). No time outside of that interval will be scheduled. It will be the proposer’s responsibility to see that the requested exposure time is an appropriate match to the length of time to be covered by the phase constraint. Two separate phase constraints are now permitted.

D.5.6 Uninterrupted Observation

There are two categories of observation included in the Uninterrupted Observation constraint. Proposers may select either of these categories.

The “Minimum Constant Pointing Direction Time” is the minimum desired time that RXTE must observe the source, without slewing to another source, but allowing interruptions for occultation, SAA passage, etc.

The “Minimum Continuous Viewing Zone Time” is the minimum desired time that RXTE must observe the source, without slewing to another source, and NOT allowing ANY interruptions for occultation, SAA passage, etc.

Note that SAA passages occur about one per orbit for 6 consecutive orbits per day, and that the position of the source on the sky may rule out long periods of continuous viewing. The user should also note that unavoidable short interruptions may still occur for operational reasons such as data dropouts.

D.5.7 TOO Observation

A TOO observation may be tied to a change in the X-ray flux as detected by the ASM. The ASM is discussed in Chapter 6 of the RXTE Technical Description. The ASM count rate that is to trigger the TOO should be entered. If the TOO is to be triggered by a means other than the ASM, the “TOO Triggered by Optical/Other Observations” box must be flagged. Full details of TOO Observations are covered in Chapter 3 of the Technical Description.

D.6 Budget Summary

The Budget Summary must be filled out in accordance with the policy of the PI’s institution and Appendix C of this NRA. Note that the Budget Summary should *not* be submitted with the Stage 1 scientific and technical proposal. Cost proposals will be requested from those proposers who are selected for continued consideration as a result of the Stage 1 scientific and technical review. If the Budget Summary is used, please include a detailed budget for each Co-I seeking support. The PI’s page should include the Co-I totals as line items. The submitted cost proposal package should include all of the information necessary for the members of the Stage 2 review to evaluate the requested financial support.

D.7 Certifications

The enclosed forms entitled “Certification Regarding Debarment, Suspension, and Other Responsibility Matters,” “Certification Regarding Drug-Free Workplace Requirement,” and “Certification Regarding Lobbying” must be completed as stipulated therein. As with the Budget Summary form, it is *not* necessary to submit these forms with the scientific and technical proposal; completed forms are required only at the time of submission of a cost proposal for the Stage 2 evaluation.